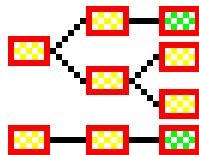

Site Conceptual Exposure Model Builder



User Manual

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U.S. Department of Energy
Office of Environmental Policy and Assistance
RCRA/CERCLA Division, EH-413
Washington, DC



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Introduction

The Department of Energy's (DOE's) Office of Environmental Policy and Assistance (EH-41) provides policy guidance and technical assistance on hazardous and mixed waste issues and environmental restoration at DOE facilities. CERCLA and RCRA programs require risk assessments to be conducted at many DOE sites to determine potential impacts of contamination on public health and the environment. In order to develop risk assessment data quality objectives (DQOs), observational approach decisions, and contaminant sampling design specifications, the environmental restoration project team frequently uses a Site Conceptual Exposure Model (SCEM).

The purpose of a SCEM is to provide a conceptual understanding of the potential for exposure to hazardous and/or radiological contaminants at a site based on the source of contamination, the release mechanism, the exposure pathway, and the receptor. A SCEM includes a graphical presentation that relates the source of contamination to human and ecological receptors. Based on a SCEM, a data collection strategy can be developed to prioritize field sampling activities and reduce uncertainty in risk characterization (e.g., contaminant release/transport mechanisms, receptor profiles, etc.). A SCEM may also provide sufficient information to allow for development of a strategy for early response actions to address exposure pathways that are considered complete and pose an imminent risk to public health.

DOE environmental restoration program managers (ERPMS) need the ability to develop SCEMs that promptly generate a range of "what-if" scenarios to respond to questions regarding site exposure conditions and data collection programs. The SCEM Builder is a user friendly computer tool that considerably shortens the time required to generate SCEM diagrams and associated documentation.

The SCEM Builder conceptually connects the source of contamination to human and ecological receptors by means of graphical boxes and lines. Sources of contamination and receptors are represented by boxes; release and exposure mechanisms are represented by lines. Note that fate and transport are implicitly treated by the SCEM Builder by means of a release mechanism from a source to another source; and by means of a exposure mechanism from a source to a receptor. Figure 1.1 shows the SCEM Builder main window with an example of a SCEM diagram.

Menu Bar
 Toolbar 1
 Toolbar 2

D i a g r a m
 Screen

Status Bar

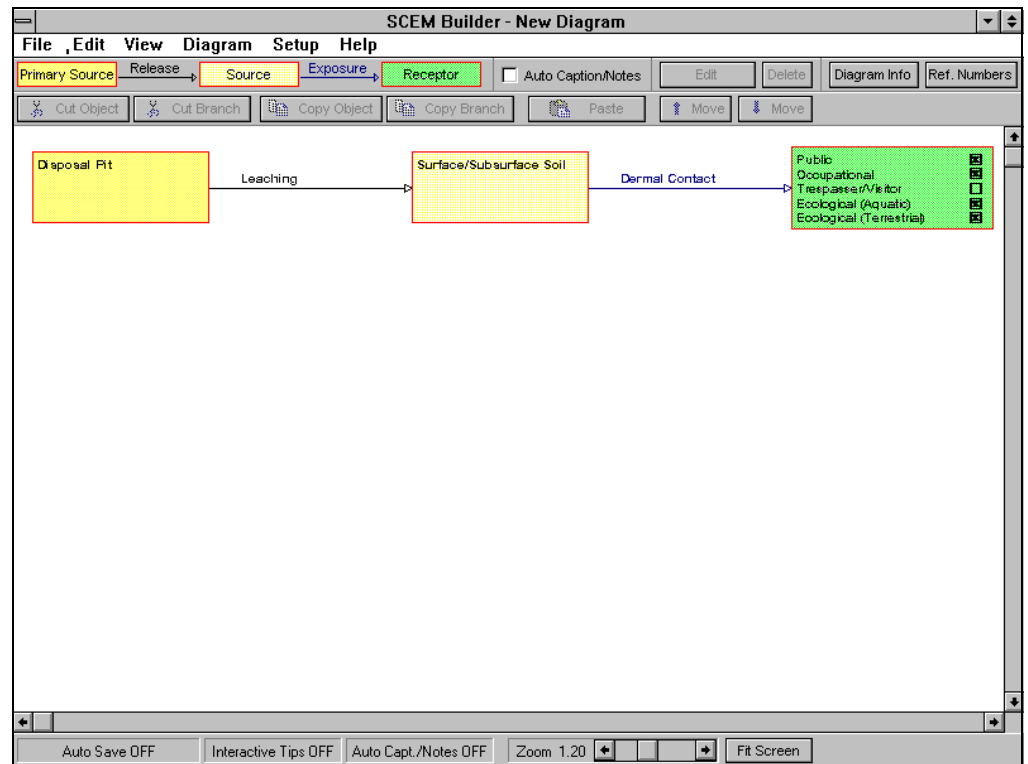


Figure 1.1 - SCEM Builder Main Window



1

Getting Started

The SCEM Builder is distributed on three high density IBM formatted diskettes. The application is written in Microsoft's Visual Basic and runs identically under Windows 3.1 or Windows 95. The illustrations in this manual show the SCEM Builder running under Windows 3.1.

The user should have a basic understanding of the Windows operating system to use the SCEM Builder properly. The layouts of the basic functions of the SCEM Builder are designed to follow Microsoft Windows guidelines.

System Requirements

The SCEM Builder was designed to run efficiently on a IBM compatible computer system with a 486 processor running at the clock speed of 25 MHz, and with 4 megabytes of random access memory (RAM). The computer should have Microsoft Windows 3.1 or higher operating system installed. The SCEM Builder uses approximately 3 megabytes of disk space for its storage. A "mouse" input device is useful, but not necessary to operate the program.

Installation

The SCEM Builder includes an installation routine that prompts the user for minimal information, such as location of where the program is stored in the computer system's hard drive. To initiate the installation, the user inserts the SCEM Builder installation diskette (diskette 1) in the computer disk drive. High density disk drives are usually designated as the *a:* drive.

To install the SCEM Builder, the user clicks on the File menu of the Windows Program Manager (the screen that opens when Windows is started). In the File menu, the user chooses the option *Run*. The computer system opens up a window where the user types the name of the drive (e.g., *a:*) and *setup*. The SCEM Builder starts the automatic installation routine and the necessary files are decompressed and copied onto the user's computer system in a designated location. The SCEM Builder creates the default directory *scem* on the operating system's drive (e.g., *c:/scem*).

Support

EH-413 developed the SCEM Builder to facilitate generation of the SCEM diagrams requested by EPA as part of CERCLA documentation. The SCEM Builder is distributed free of charge primarily to DOE personnel involved in CERCLA and RCRA actions. EH-413 can conduct demonstrations and/or training workshops if requested by DOE offices.

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Program Overview

The SCEM Builder is a computer tool used to design SCEM diagrams. The program has some limited “intelligence,” in the form of a help system on building SCEM diagrams, as well as interactive messages and tips that the program will display to help the user in building the SCEM diagram.

The SCEM Builder includes the following components:

- Diagram Builder
- Diagram Information Screen
- Notes
- Help System

Diagram Builder

The Diagram Builder is the component of the SCEM Builder where the diagrams are constructed. A SCEM Builder diagram consists of the following objects (in this context, an object refers to a box or a line in the SCEM Builder diagram) :

- | | |
|--------------|---|
| <u>Boxes</u> | <ul style="list-style-type: none">• Primary Source - the source of the contamination.• Source - the secondary, tertiary, etc., source of contamination, if any.• Receptor - the flora, fauna, or humans that may be exposed to a contaminated medium. |
| <u>Lines</u> | <ul style="list-style-type: none">• Release Mechanism - how the contamination is released from the source.• Exposure Mechanism - how the receptor is exposed to the contamination. |

SCEM diagrams can range from simple to quite complex, as depicted in Figures 3.1 through Figure 3.3.

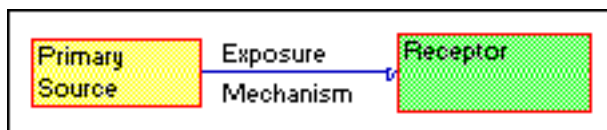


Figure 3.1 - Simplest SCEM Diagram

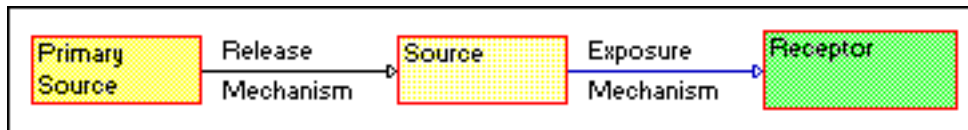


Figure 3.2 - Simple SCEM Diagram

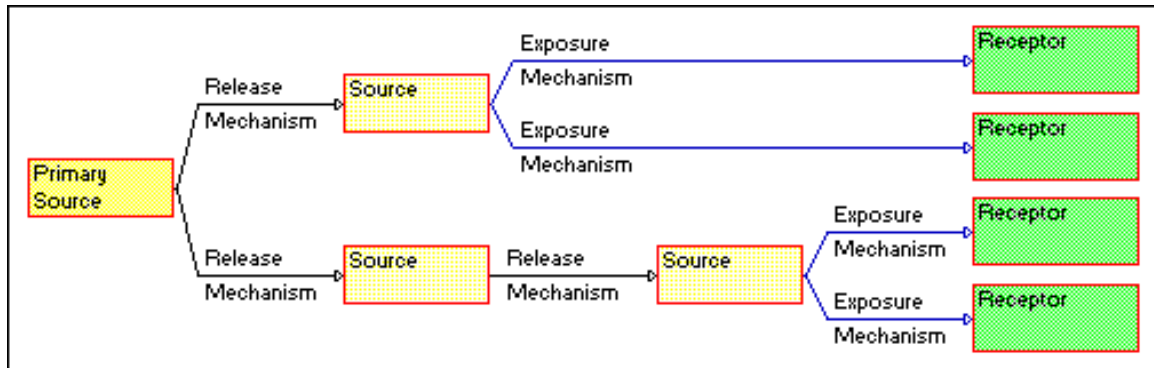


Figure 3.3 - Complex SCEM Diagram

Diagram Building Rules

The following rules must be observed when building a SCEM diagram:

- Diagrams can have one or more Primary Sources.
- A Primary Source can have one or more Release Mechanisms, and/or one or more Exposure Mechanisms.
- A Source can have one or more Release Mechanisms, and/or one or more Exposure Mechanisms.
- A Release Mechanism links one Primary Source to the next Source, or one Source to the next Source.
- An Exposure Mechanism links one Source to one Receptor.

The SCEM Builder includes an example of a diagram. Open the diagram *example.scm* and examine it to become more familiar with the concept.

Diagram Information Window

Each diagram contains a Diagram Information window that includes global information such as diagram title, diagram description, creation date, etc. This information can be edited by the user. Figure 3.4 is an example of a Diagram Information window.

Figure 3.4 - Diagram Information Window

Notes

Each object on the diagram can have an associated note. For example, a note can describe the findings on the site, any assumptions, and description of the sources and pathways, etc.

Help System

The program includes two distinct help systems: Program Help and SCEM Help.

Program Help

This function provides information and guidance on the operation of the program. It explains, for example, how to cut and paste an object, how to print, and how to save or load a diagram. This help system is activated via the Help menu, or by pressing the **F1** key.

SCEM Help

SCEM Help provides information on default environmental factors built into the program, such as descriptions of contaminant sources commonly found at CERCLA sites. SCEM Help will present the user with a table of contents to select the topic of interest. This help system is activated via the Help menu.

Interactive Tips

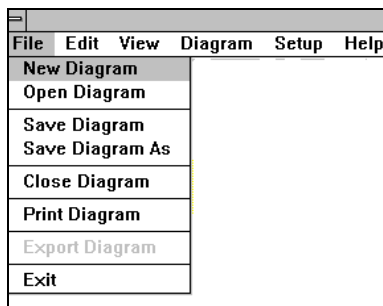
This system will monitor the activity of the user and display pop-up windows with tips on building the SCEM diagram. The user will have the ability to turn these help tips on or off.

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3

Menus

File



New Diagram

Opens a new blank diagram. To access this menu option, click on File, then select New Diagram.

Open Diagram

Opens a previously saved diagram. The user is prompted to select a file from a drive. To access this menu option, click on File, then select Open Diagram.

Save Diagram

Saves the diagram. In the case of a new diagram, the program will prompt the user for a file name. If no new filename is provided, the existing file is overwritten. To avoid overwriting the existing file, use the Save Diagram As menu option (see below). To access this menu option, click on File, then select Save Diagram.

Save Diagram As

Prompts the user for a file name and then saves the diagram. The SCEM Builder includes a diagrams directory as the default path for saving files. Diagrams are saved with a *.scm extension. To access this menu option, click on File, then select Save Diagram As.

Close Diagram

Closes the diagram. If changes have been made, the program will prompt the user to save the file before closing the diagram. To access this menu option, click on File, then select Close Diagram.

Print Diagram

Brings up the Print Diagram window. To access this menu option, click on File, then select Print Diagram.

Export Diagram

Feature to be implemented in next version of the SCEM Builder.

Exit

Shuts down the SCEM Builder. If a diagram is open and changes have been made, the program will prompt the user to save the file before shutting down. To access this menu option, click on File, then select Exit.

Edit

File	Edit	View	Diagram	Setup	Help
	Cut			Ctrl+X	▶
	Copy			Ctrl+C	▶
	Paste			Ctrl+V	
	Add Primary Source				
	Add Source				
	Add Release Mechanism				
	Add Exposure Mechanism				
	Add Receptor				
	Move Branch Up			PgUp	
	Move Branch Down			PgDn	
	Edit			Enter	
	Delete			Del	

Cut

This menu selection has two options:

- Object - Cuts the selected object. The object is removed from the diagram and placed in the Windows clipboard. From there, it can be pasted elsewhere on the diagram. This command can also be accessed by clicking the Cut Object button on Toolbar 2.
- Branch - Cuts the selected branch. A branch consists of all objects from the selected object to the right. By using the Cut Branch option, a branch is removed from the diagram and placed in the Windows clipboard. From there, it can be pasted elsewhere on the diagram. This command is also accessed by clicking the Cut Branch button on Toolbar 2.

If no object is selected, this menu option is not accessible and appears grey on the screen. See also Copy and Paste. To access this menu option, click on Edit, then select Cut.

Copy

This menu selection has two options:

- Object - Copies the selected object. The object is copied into the Windows clipboard. From there, it can be pasted elsewhere on the diagram. This command can also be accessed by clicking the Copy Object button on Toolbar 2.
- Branch - Copies the selected branch. A branch consists of all objects from the selected object to the right. The branch is copied into the clipboard. From there, it can be pasted elsewhere on the diagram. This command can also be accessed by clicking the Copy Branch button on Toolbar 2.

This menu option is not accessible and appears grey on the screen if no object is selected. See also Cut and Paste. To access this menu option, click on Edit, then select Copy.

Paste

Adds the object or branch in the Windows clipboard to the diagram. Note, however, that it is not possible to paste an object to a Receptor because the Receptor is always the last object in the branch. If the clipboard is empty, this menu option is not accessible and appears grey on the screen. To access this menu option, click on Edit, then select Paste. This command can also be accessed by clicking the Paste button on Toolbar 2.

Add Primary Source

Adds a Primary Source to the diagram. See Introduction for more information about SCEM diagrams and the definition of Primary Source. To access this menu option, click on Edit, then select Add Primary Source. This command can also be accessed by clicking and dragging the Primary Source box on Toolbar 1.

Add Source

Adds a Source to the diagram. A Source can be added only to a Release. For this menu option to be enabled, a Release has to be selected first. See Chapter 3 for more information about SCEM diagrams and the definition of Source. To access this menu option, click on Edit, then select Add Source. This command can also be accessed by clicking and dragging the Source box on Toolbar 1.

Add Release Mechanism

Adds a Release Mechanism to the diagram. A Release Mechanism can be added only to a Primary Source or a Source. Therefore, a Primary Source or a Source has to be selected first for this menu option to be enabled. To access this menu option, click on Edit, then select Add Release Mechanism. This command can also be accessed by clicking and dragging the Release arrow on Toolbar

1.

Add Exposure Mechanism

Adds an Exposure Mechanism to the diagram. An Exposure Mechanism can be added only to a Primary Source or a Source. Therefore, a Primary Source or a Source has to be selected first for this menu option to be enabled. See Chapter 3 for more information about SCEM diagrams and the definition of Exposure Mechanism. To access this menu option, click on Edit, then select Add Exposure Mechanism. This command can also be accessed by clicking and dragging the Exposure arrow on Toolbar 1.

Add Receptor

Adds a Receptor to the diagram. A Receptor can be added only to an Exposure Mechanism. For this menu option to be enabled, an Exposure Mechanism has to be selected first. To access this menu option, click on Edit, then select Add Receptor. This command can also be accessed by clicking and dragging the Receptor box on Toolbar 1.

Move Branch Up

Rearranges the appearance of the diagram by moving a branch up. See Move Branch Down menu for more information. To access this menu option, click on Edit, then select Move Branch Up. This command can also be accessed by clicking the Move button with the arrow pointing up on Toolbar 2.

Move Branch Down

Rearranges the appearance of the diagram by moving a branch down. For this option to be enabled, an object in the branch has to be selected (e.g., Release Mechanism, Exposure Mechanism). To access this menu option, click on Edit, then select Move Branch Down. This command can also be accessed by clicking the Move button with the arrow pointing down on Toolbar 2. The following examples show this menu option. Figure 4.1 shows a diagram before the Move Branch Down operation. Figure 4.2 shows the same diagram after the Move Branch Down operation.

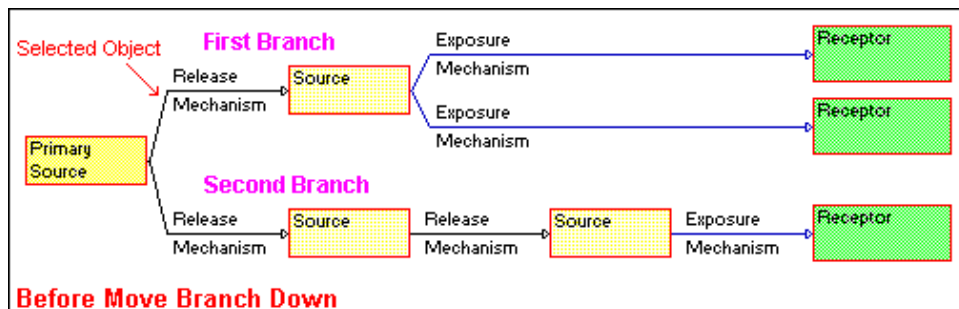


Figure 4.1 - Example of SCEM Diagram before Move Branch Down Operation

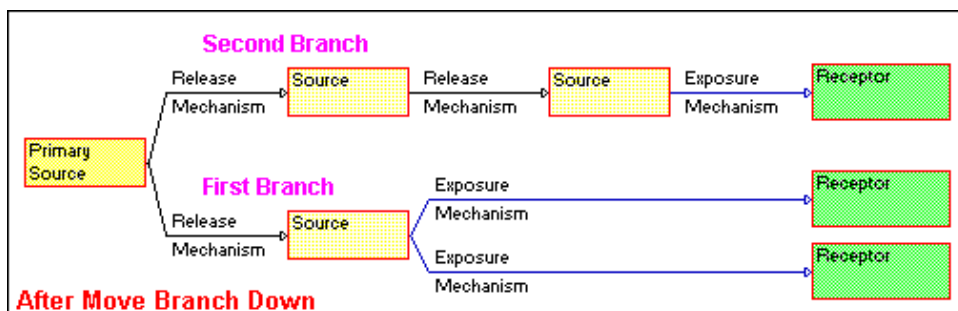


Figure 4.2 - Example of SCEM Diagram after Move Branch Down Operation

Edit

An object has to be selected first for this menu option to be enabled. Choosing Edit under the Edit Menu brings up the edit window for the currently selected object (e.g., Primary Source, Source, Release Mechanism, Exposure Mechanism, or Receptor). To access this menu option, click on Edit, then select Edit. The SCEM Builder will display a dialog window pertinent to the selected object. This command can also be accessed by clicking the Edit button on Toolbar 1.

Delete

An object has to be selected first for this menu option to be enabled. To access this menu option, click on Edit, then select Delete. Deletes the currently selected object (e.g., Primary Source, Source, Release Mechanism, Exposure Mechanism, or Receptor). If the object is in the middle of the branch and there are objects to the right, the program will ask the user for confirmation of the delete function. If the user confirms deletion, all the objects to the right of the selected object will also be deleted. This command can also be accessed by clicking the Delete button on Toolbar 1.

View

View	Diagram
Zoom 0.25	
Zoom 0.50	
Zoom 0.75	
Zoom 1.00	
Zoom 1.25	
Zoom 1.50	
Zoom 1.75	
Zoom 2.00	
Fit Screen	

Zoom

Allows the user to select a zoom factor of 0.25, 0.50, 1.00, 1.25, 1.50, 1.75, and 2.00. Note that the scroll bar on the Status Bar allows selection of the zoom factor from 0.10 to 3.00 in increments of 0.05. See also the Status Bar and Fit Screen menu. To access this menu option, click on View, then

select the desired Zoom factor. This command can also be accessed by clicking on the Zoom arrows on the Status Bar.

Fit Screen

Adjusts the zoom factor so that the entire diagram is visible on the screen. See also the Status Bar and Zoom menu. To access this menu option, click on View, then select Fit Screen. This command can also be accessed by clicking the Fit Screen button on the Status Bar.

Diagram

View	Diagram	Setup	Help
	Diagram Information		
	Line Styles		
	Default Receptor Captions		
	Reference Numbers		

Diagram Information

Brings up the Diagram Information Window. This window allows the user to enter information about the diagram, such as a title for the diagram, the author of the diagram, and the date the diagram was created. Please refer to Diagram Information Window in Chapter 5 for a complete description of its useability. To access this menu option, click on Diagram, then select Diagram Information. This command can also be accessed by clicking the Diagram Information button on Toolbar 1.

Line Styles

Brings up the Line Styles window. This window allows the user to name each of the three line styles that can be used in the program for the Release and Exposure Mechanisms. Please refer to Line Styles Window in Chapter 5 for a complete description of its useability. To access this menu option, click on Diagram, then select Line Styles.

Default Receptor Captions

Brings up the Default Receptor Captions window. This window allows the user to name the default receptor captions for the Receptor object. Please refer to Default Receptor Window in Chapter 5 for a complete description of its useability. To access this menu option, click on Diagram, then select Default Receptor Captions.

Reference Numbers

Brings up the Reference Numbers Setup window. This window allows the user to include a reference number with each object in the diagram. Please refer to Reference Setup Window in Chapter 5 for a complete description of its useability. To access this menu option, click on Diagram, then select Reference Numbers. This command can also be accessed by clicking the Reference Numbers button on Toolbar 1.

Setup

Diagram	Setup	Help
	✓ Show Toolbar 1	
	✓ Show Toolbar 2	
	✓ Show Status Bar	
	Auto Save (3 minutes)	
	Auto Caption/Notes	
	Interactive Tips	
	Notes Window	
	Font	►

Show Toolbar 1

Turns the Toolbar 1 on and off. Toolbar 1 has a number of buttons that access frequently used operations quickly. Please refer to Toolbar 1 in Chapter 6 for a complete description of its useability. The program starts with this option on (i.e., Toolbar 1 is visible). To access this menu option, click on Setup, then select Show Toolbar 1.

Show Toolbar 2

Turns the Toolbar 2 on and off. Toolbar 2 has additional buttons that access frequently used operations quickly. Please refer to Toolbar 2 in Chapter 6 for a complete description of its useability. The program starts with this option on (i.e., Toolbar 2 is visible). To access this menu option, click on Setup, then select Show Toolbar 2.

Show Status Bar

Turns the Status Bar on and off. The Status Bar shows useful information about various options in the program and includes a Zoom scroll bar and a Fit Screen button. Please refer to Status Bar in Chapter 6 for a complete description of its useability. The program starts with this option on (i.e., the Status Bar is visible). To access this menu option, click on Setup, then select Show Status Bar.

Auto Save

Turns the auto save feature on or off. If on, the program automatically saves the diagram every 3 minutes. The program starts with this option off (i.e., the program will not automatically save the diagram). To access this menu option, click on Setup, then select Auto Save.

Auto Caption/Notes

Turns the auto caption feature on or off. If Auto Caption/Notes is on, the program prompts the user for a caption and notes when a new object is added to the diagram. If Auto Caption/Notes is off, the user has to click on Edit to enter a caption and notes for an object. The program starts with this option off (i.e., the program will not automatically prompt the user for a caption and notes). To access this

menu option, click on Setup, then select Auto Caption/Notes. This command can also be accessed by clicking the Auto Caption/Notes button on Toolbar 1.

Interactive Tips

Feature may be implemented in next version of the program.

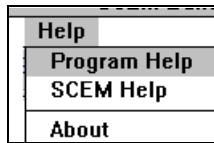
Notes Window

Allows the user to turn the Notes window on or off. The SCEM Builder allows for one Notes window to be continuously open on the Main window. The open Notes window refers to the selected object. If another object is selected, the Notes window will display the respective notes for that newly selected object. Please refer to Notes Window in Chapter 5 for a complete description of its useability. To access this menu option, click on Setup, then select Notes Window. This command can also be accessed by clicking the Auto Caption/Notes button on Toolbar 1.

Font

Allows the user to select a font for the diagram. Two fonts are available: Arial and Lucida Sans. A font can be selected if it is installed in the computer. To access this menu option, click on Setup, then select Font.

Help



Program Help

Displays help with the operation of the program. To access this menu option, click on Help, then select Program Help.

SCEM Help

Displays help with basic environmental concepts designed into the SCEM Builder. To access this menu option, click on Help, then select SCEM Help.

About

Brings up the "About" window. This window displays basic information about the program, including version number and copyright notice. To access this menu option, click on Help, then select About.

4

Windows

The SCEM Builder was developed with a user friendly interface that makes use of various windows. These windows are screens that allow the user to input information and/or select from a list of default factors. This chapter provides information on all the windows that are included in the SCEM Builder.

Main Window

SCEM diagrams are built and displayed in this window. The Main window is also referred to as the Diagram Builder window because that is where the diagrams are manipulated and displayed. A number of menus at the top of the window allow the user to perform various operations on a diagram. Information on these menus was presented in the previous chapter.

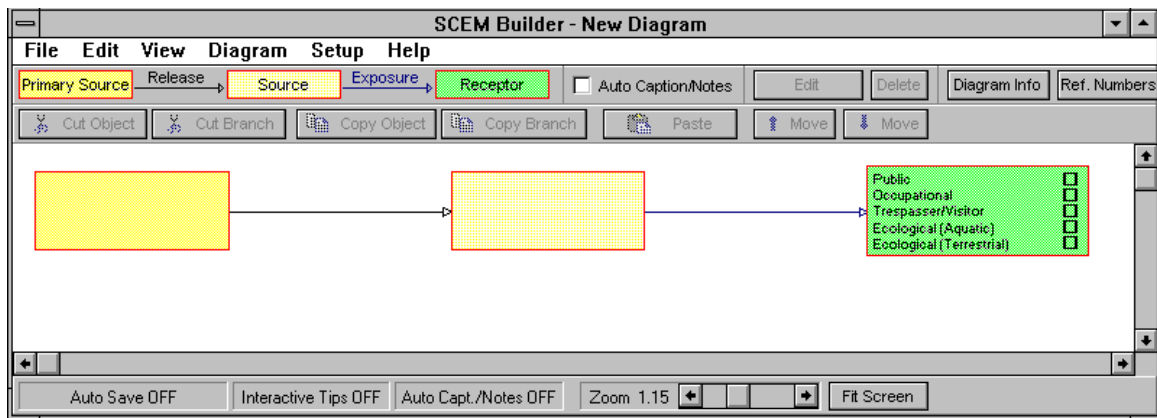


Figure 5.1 - SCEM Builder Main Window

Beneath the menu bar, the SCEM Builder includes two toolbars that allow for quick access to the most common functions. At the bottom of the screen, the SCEM Builder includes a status bar that displays various program information, a scroll bar to adjust the zoom factor, and a button that, when clicked on, fits the diagram to the screen. When the SCEM Builder starts, both toolbars and the status bar are visible on the screen. Note that the toolbars and the status bar can be made visible or removed from the screen by using the Setup menu, Show Toolbar 1 Menu, Show Toolbar 2 Menu, and Show Status Bar Menu.

New / Edit Primary Source Window

A Primary Source on the diagram has to be selected for this menu option to be enabled. Allows the user to enter information about the selected Primary Source. This window is accessed through the Edit menu; then select Edit (see Edit under Edit Menu in previous chapter).

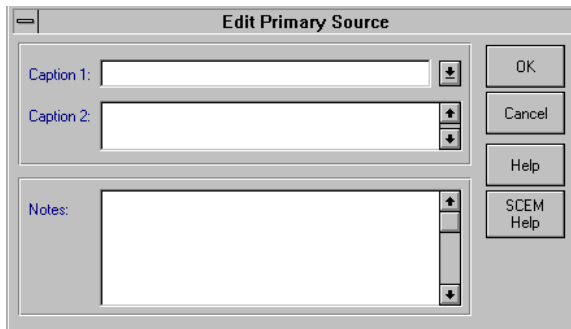


Figure 5.2 - Edit Primary Source Window

- **Caption 1** - This text box is used for the main caption. On the diagram in the Main Window, this will be displayed as a bold line of text. Text is entered either by typing a caption, or by selecting from a list of captions included in the program (i.e., click on the small down arrow to the right of Caption 1 box).
- **Caption 2** - This text box is used for an additional sub-caption. On the diagram in the Main Window, up to three lines of text can be displayed.
- **Notes** - This text box can be used to enter additional information (up to 4,096 characters). Notes are not automatically displayed on the diagram screen (because of space constraints); however, the user can direct that notes be displayed on the diagram screen in a separate window (see Chapter 4). Notes can also be printed. See the Print Diagram and Notes windows.

New / Edit Source Window

A Source on the diagram must be selected for this menu option to be enabled. This window allows the user to enter information about the selected Source. This window is accessed through the Edit menu; then select Edit (see Edit under Edit Menu in previous chapter).

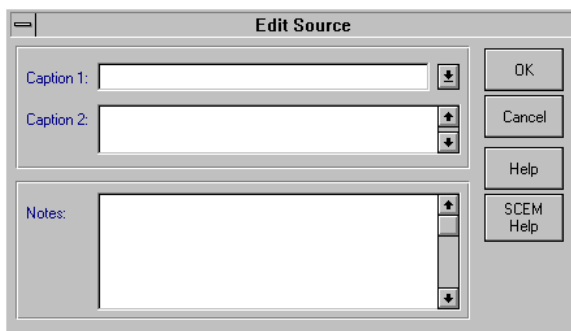


Figure 5.3 - Edit Source Window

- **Caption 1** - This text box is used for the main caption. On the diagram, this will be displayed

as a bold line of text. Text is entered by typing a caption, or by selecting from a list of captions included in the program (i.e., click on the small down arrow to the right of Caption 1 box).

- Caption 2 - This text box is used for an additional caption. On the diagram in the Main Window, up to three lines of text can be displayed.
- Notes - This text box can be used to enter additional information (up to 4,096 characters). Notes are not automatically displayed on the diagram screen (because of space constraints); however, the user can direct that notes be displayed on the diagram screen in a separate window (see Chapter 4). Notes can also be printed. See the Print Diagram and Notes windows.

New / Edit Release Mechanism Window

A Release Mechanism on the diagram must be selected for this menu option to be enabled. Allows the user to enter information about the selected Release Mechanism. This window is accessed through the Edit menu; then select Edit.



Figure 5.4 - Edit Release Mechanism Window

- Caption 1 - This text box is used for the main caption. On the diagram in the Main Window, this will be displayed as a bold line of text. Text is entered by typing a caption, or by selecting from a list of captions included in the program (i.e., click on the small down arrow to the right of Caption 1 box).
- Caption 2 - This text box is used for an additional sub-caption. On the diagram in the Main Window, up to three lines of text can be displayed.
- Line Style - This is used to select the line style for the release mechanism from one of three pre-defined styles. See Line Styles window.
- Notes - This text box can be used to enter additional information (up to 4,096 characters). Notes are not automatically displayed on the diagram screen (because of space constraints); however, the user can direct that notes be displayed on the diagram screen in a separate window (see Chapter 4). Notes can also be printed. See the Print Diagram and Notes

windows.

New / Edit Exposure Mechanism Window

An Exposure Mechanism on the diagram must be selected for this menu option to be enabled. Allows the user to enter information about the selected Exposure Mechanism. This window is accessed through the Edit menu; then select Edit (see Edit under Edit Menu in previous chapter).

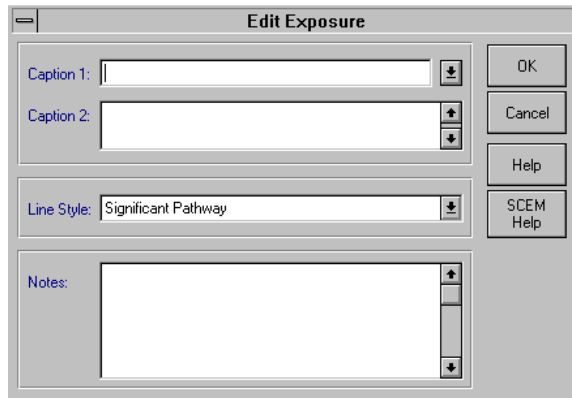


Figure 5.5 - Edit Exposure Mechanism Window

- **Caption 1** - This text box is used for the main caption. On the diagram in the Main Window, this will be displayed as a bold line of text. Text is entered by typing a caption, or by selecting from a list of captions included in the program (i.e., click on the little down arrow to the right of Caption 1 box).
- **Caption 2** - This text box is used for an additional sub-caption. On the diagram in the Main Window, up to three lines of text can be displayed.
- **Line Style** - This is used to select the line style from one of three pre-defined styles. See the Line Styles window.
- **Notes** - This text box can be used to enter additional information (up to 4,096 characters). Notes are not automatically displayed on the diagram screen (because of space constraints); however, the user can direct that notes be displayed on the diagram screen in a separate window (see Chapter 4). Notes can also be printed. See the Print Diagram and Notes windows.

New / Edit Receptor Window

A Receptor on the diagram must be selected for this menu option to be enabled. Allows the user to enter information about the selected Receptor. This window is accessed through the Edit menu; then select Edit (see Edit under Edit Menu in previous chapter).

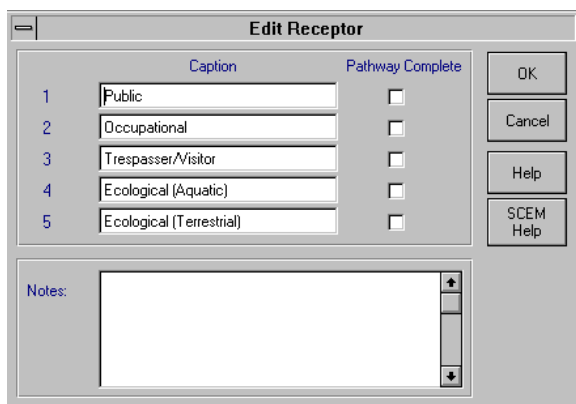


Figure 5.6 - Edit Receptor Window

- **Captions** - The Receptor object can have a maximum of five captions. Each caption can describe a potential receptor for the same contaminant release.
- **Pathway Complete** - Five check boxes are associated with the five potential receptor types (described in the five captions). For each potential receptor type, the user can check a box to mark a complete exposure pathway.
- **Notes** - This text box can be used to enter additional information (up to 4,096 characters). Notes are not automatically displayed on the diagram screen (because of space constraints); however, the user can direct that notes be displayed on the diagram screen in a separate window (see Chapter 4). Notes can also be printed. See the Print Diagram and Notes windows..

Line Styles Window

Allows the user to name each of the three line styles that can be used in the program for the Release and Exposure Mechanisms. The names of the line styles can be printed together with the diagram. This window is accessed through the Diagram menu; then select Line Styles.

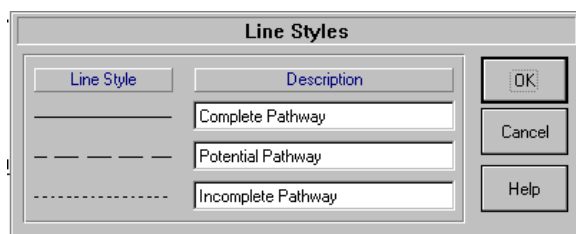


Figure 5.7 - Line Styles Window

Notes Window

Displays the notes for a selected object to allow the user to review the information entered for that object. The Notes Window does not support text editing. To enter or change notes for an object, first select an object, then use the Edit command under the Edit menu. A click of the mouse on the Notes Window will have the same effect and will bring up the edit window for the selected object. The Notes

Window can be made visible or removed from the screen by using the Setup menu, Notes Window Menu option.

Default Receptor Captions Window

Allows the user to name the default receptor captions for the Receptor object. These captions will be used each time a new receptor object is created. To create a new receptor object click and drag a receptor box from Toolbar 1 or choose the Add Receptor command under the Edit Menu) . See also the Edit Receptor window.

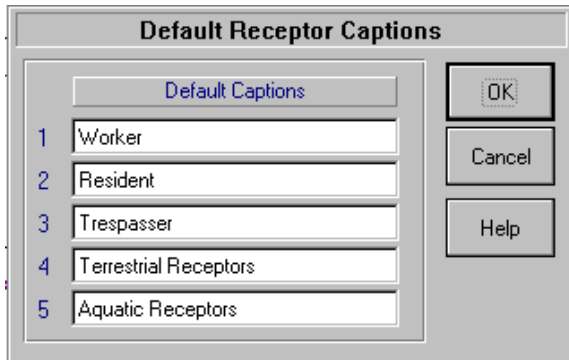


Figure 5.8 - Default Receptor Captions Window

Diagram Information Window

This window is accessed through the Diagram menu; then select Diagram Information.

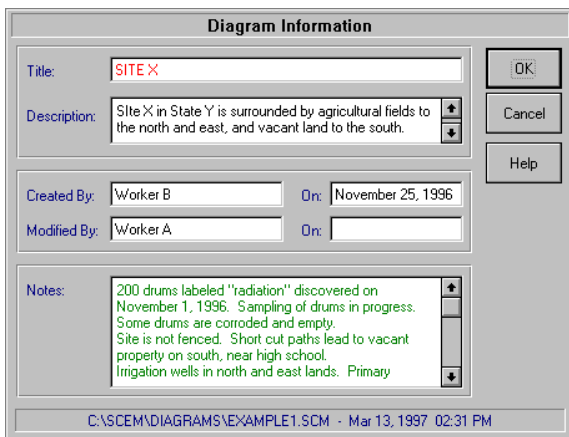


Figure 5.9 - Diagram Information Window

This window allows the user to enter the following information about the diagram:

- Title, Description - These text boxes allow the user to enter the title of the diagram and a description.
- Created By, On - Use these text boxes for the name of the person who created the diagram, and to enter the date the diagram was created.

- Modified By, On - Use these text boxes for the name of the last person who modified the diagram, and the respective date.
- Notes - Use this text box to type additional information about the diagram.

Print Diagram Window

Allows the user to print the diagram. This window is accessed through the File menu; then select Print Diagram. The Print Options, Page Setup, and Diagram Size options allow the user control over printing. The OK button prints the diagram. Please note that the program does not include printer selection. The printer is selected from the Microsoft Windows Operating System Control Panel, under Printers.

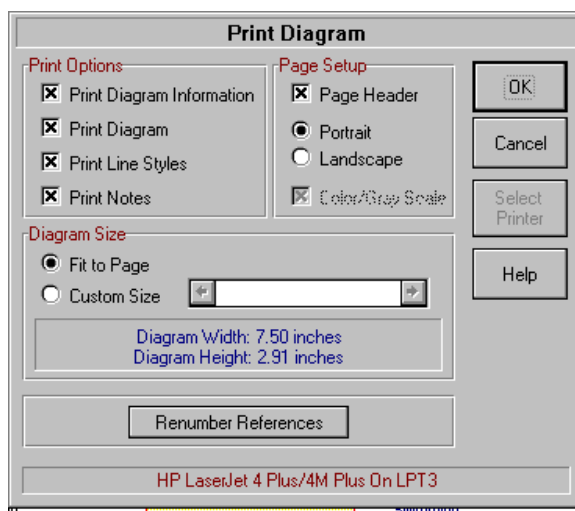


Figure 5.10 - Print Diagram Window

The SCEM Builder includes the following printing option:

- Print Diagram Information - Click on this check box to print diagram information. This includes the title of the diagram, the description, etc. See also Diagram Information Window.
- Print Diagram - Click on this check box to print the diagram itself.
- Print Line Styles - Click on this check box to print line style descriptions. See also Line Style Window.
- Print Notes - Click on this check box to print the notes associated with each object.

For notes to be referenced to the respective object on the diagram, Sequential or Scientific reference numbers have to be enabled. See Reference Setup Window.

- Page Header - Click on this check box to have the header printed on every page. The header

includes the diagram title, current date, and page number.

- Portrait - Click on this option box to print in portrait mode.
- Landscape - Click on this option box to print in landscape mode.
- Color/Gray Scale - Feature to be implemented in the next version of the program.
- Fit to Page - Click on this option box to have the diagram automatically sized to fit on one printed page.
- Custom Size - Click on this option box and then use the scroll bar to manually set the size of the diagram.
- Renumber References Button - Click on this button to renumber reference numbers before printing the diagram. This button is enabled only if Sequential Reference Numbers are enabled. See Reference Setup Window.
- OK Button - Prints the diagram.
- Select Printer Button - Feature to be implemented in the next version of the program.

Reference Setup Window

Allows the user to include a reference number with each object in the diagram. This window is accessed through the Diagram menu; then select Reference Numbers.

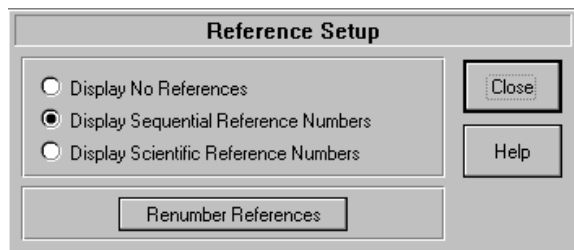


Figure 5.11 - Reference Setup Window

The SCEM Builder includes the following Reference Setup options:

- Display No References - Displays no reference numbers.
- Display Sequential Reference Numbers - Displays sequential reference numbers. (e.g., 1, 2, 3). By inserting or deleting objects, these numbers can get out of sequence. Use the Renumber References button to correct that.
- Display Scientific Reference Numbers - Displays scientific reference numbers. (e.g., 1.1, 1.1.1, 1.1.2). Scientific reference numbers are always renumbered when inserting or deleting objects.

- Renumber References Button - This button is enabled only if Sequential Reference Numbers are selected. Numbers can get out of sequence when inserting or deleting objects. This button fixes that.

Export Diagram Window

Feature may be implemented in the next version of the program.

Select Printer Window

Feature may be implemented in the next version of the program.

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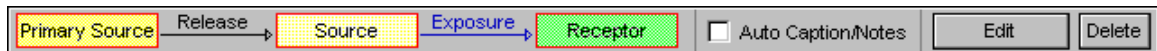
5

Toolbars

Toolbars are time-saving features that give the user the ability to point-and-click on a graphical representation of a program function and have that function respond immediately. The SCEM Builder has two toolbars above the Diagram Builder window and one toolbar below the Diagram Builder window.

Toolbar 1

Toolbar 1 has a number of buttons that access frequently used operations quickly. All of the features accessible from the toolbar are also accessible through the program menus. Toolbar 1 can be made visible or removed from the screen by using the Setup menu and selecting the Show Toolbar 1 option.



The five objects on the left represent Primary Sources, Release Mechanisms, Sources, Exposure Mechanisms, and Receptors. These objects can be selected, dragged, and dropped onto the Diagram Builder window - faster than using the Add option under the Edit menu. For more information, see these menu options:

- Add Primary Source
- Add Release Mechanism
- Add Source
- Add Exposure Mechanism
- Add Receptor
- Auto Caption/Notes
- Edit
- Delete

Two other buttons are also visible on the screen if the user's computer monitor supports a resolution of 800 pixels by 600 pixels.



For more information on these buttons, see Diagram Information and Reference Numbers in Chapter 4, Menus.

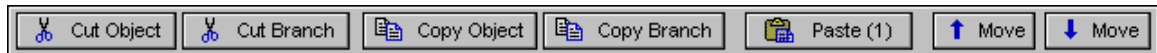
Two more buttons are visible on the screen if the user's computer monitor supports a resolution of 1,024 by 768 pixels.



For more information on these buttons, see Print Diagram and Exit in Chapter 4, Menus.

Toolbar 2

Toolbar 2 has additional buttons that access frequently used operations quickly.



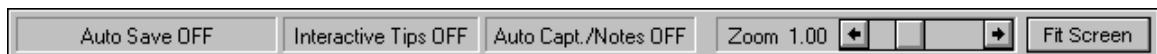
All of the features in Toolbar 2 are also accessible through the following Edit Menu options:

- Cut
- Copy
- Paste
- Move Branch Up
- Move Branch Down

Toolbar 2 can be made visible or removed from the screen by using the Setup menu and selecting the Show Toolbar 2 option. For more information on these buttons, see information on these options in Chapter 4, Menus.

Status Bar

The bar below the Diagram Builder window is named Status Bar because it offers useful information about various options in the program. The Status Bar also includes a Zoom scroll bar and a Fit Screen button. The Status Bar can also be made visible or removed from the screen by using the Setup menu and selecting the Show Status Bar option.



Auto Save and Auto Caption/Notes are options accessible to the user under the Setup menu. The Interactive Tips function may be implemented in the next version of the SCEM Builder. The Zoom and Fit Screen functions can also be accessed under the View menu.

6

Environmental Components

The SCEM Builder includes the following objects:

- Contaminant Sources
- Release Mechanisms
- Exposure Mechanisms
- Receptors

Each of these objects has a distinct interface window where the user inputs information related to a specific object. The SCEM Builder was designed to allow flexible input by the user, while also providing time-saving default configurations. *The user input window for Contaminant Sources includes a caption area where the user can type the name of the contaminant source or choose from a default list of contaminant sources.* This chapter provides information on the list of default factors incorporated into the user input windows of the SCEM Builder (i.e., Contaminant Sources, Release Mechanisms, Exposure Mechanisms, Receptors).

Contaminant Sources

A contaminant source is an area where hazardous substances (including waste and waste constituents and/or radionuclides) are located. A contaminant source may include contaminated media. Contaminant sources may be grouped as primary, secondary, or tertiary. Contamination of secondary and/or tertiary sources results from releases from the primary source. For example, contaminated biota could be a secondary or tertiary source derived from a primary source that released a hazardous substance that is bioaccumulative and amenable to uptake by terrestrial or aquatic species.

Contaminated Ground Water or Plume

This contaminant source represents an aquifer or saturated zone in subsurface soils containing contaminants that may be dissolved or exist as separate phase products (i.e., Light Non-Aqueous Phase Liquids [LNAPL] or Dense Non-Aqueous Phase Liquids [DNAPL]). Contaminants in ground water may be released and contaminate other sources such as:

- Lake, river, stream, bay, harbor, or coastal waters that receive the ground water plume discharges
- Conduits (e.g., utility lines or underground piping/sewers) that have trapped LNAPL
- Lake, river, stream, and marine sediments located at the embankment soil/surface water

interface that receives the ground water plume discharges

Cooling Tower and Its Discharge

This contaminant source includes building structures, debris, and associated swales and drainage ditches that are currently receiving or have received cooling tower discharges. Releases from this source may contaminate other sources, including:

- Surface and subsurface soils within the contaminant source area
- Surface soil immediately downgradient from the source area, including soil and sediment in swales, drainage ditches, and runoff areas
- Air containing airborne particulates or dust originating from the source area

Drip Pad or Sludge Drying Bed

This contaminant source typically includes an above ground area, including enclosures or berms, sumps, or overflow channels, used to drain liquids off wastewater treatment plant sludges, laboratory tank bottoms, or semi-solids. The pad or bed may be constructed of concrete, asphalt, gravel, or soil. Drip pads or sludge drying beds may release contaminants creating secondary sources, including:

- Surface and subsurface soils within the contaminant source area
- Surface soil immediately downgradient from the source area, including soil and sediment in swales, and/or drainage ditches
- Air containing airborne particulates/dust or gaseous materials originating from the source area

Fire Training Area

This contaminant typically includes an above ground area used to train fire fighting personnel on fire control techniques. A fire training area is typically an outdoor facility that may not be readily identifiable if the area has no engineering structures (e.g., concrete or gravel pads) and has not been used for a long time. Releases from fire training areas may create additional secondary sources of contaminants, including:

- Surface and subsurface soils within the contaminant source area
- Surface soil immediately downgradient from the source area, including soil and sediment in swales, drainage ditches, and runoff areas, if any
- Air containing airborne particulates/dust originating from the source area

Firing Range

This contaminant source typically includes an above ground area that encompasses razed or existing buildings (indoor pistol ranges) and/or open area areas used by security personnel for target practice. Unexploded or spent ammunition containing lead and copper are typical wastes associated with firing ranges. Releases from this source may contaminate other sources, including:

- Surface and subsurface soils (for a demolished indoor range) within the contaminant source area (the entire range area)
- Surface soil immediately downgradient from the source area, including soil and sediment in swales, drainage ditches, and runoff areas, if any

French Drain or Disposal Pit

This contaminant source typically includes a below ground structure or excavation that may or may not contain engineered piping sections/extensions. It may contain gravel, stones, or other aggregates to allow seepage of liquid waste or the disposal of semi-liquids. This source area may have been filled in with soil and may not be visually identifiable on the ground surface. Historical aerial photos may show these areas barren or devoid of vegetation or ground cover. Releases from this source may contaminate other sources, including:

- Surface and subsurface soils within the contaminant area, including those of the lateral sections or extensions
- Surface soil immediately downgradient from the source area, including soil and sediment in swales, drainage ditches, and runoff areas, if any
- Air containing airborne particulates/dust or gaseous materials originating from a source
- Infiltration seeps at downgradient locations that may or may not be mixed with surface water or shallow ground water

Laboratory/Sanitary Sewers and Wastewater Treatment Plants

This contaminant source typically includes an area that includes existing or razed structures associated with treatment of laboratory and/or sanitary wastewaters. Many of these structures may be buried or abandoned in place, broken, and contain sludges that are radioactive or that could be classified as hazardous or mixed wastes. Releases from this source may contaminate other sources, including:

- Subsurface soils within the contaminant source area
- Conduits (i.e., including the abandoned in place underground treatment plant components, sewer main, manholes, and lateral sections or extensions) that were part of the sewer systems
- Surface soil (at razed structures or subsurface soil that has been turned over due to demolition

and excavation) and surface soil located immediately downgradient from the source area, including soil and sediment in swales, drainage ditches, and runoff areas, if any

- Ground water in the vadose and saturated zones
- Surface water
- Air containing airborne particulates/dust originating from the source area

Lagoon/Pond/Surface Impoundment

This contaminant source typically includes a below ground or partially above ground structure or excavation area containing contaminated solids and/or liquids (e.g., mixture of waste and runoff/precipitation). It may include natural or engineered physical structures such as pipes, swales, and embankments. Equalization ponds for receiving process water and process water/stormwater combined flow are in this category. Releases from this source may contaminate other sources, including:

- Subsurface soils that are commingled or in contact with waste within the lagoon/surface impoundment
- Surface soil or exposed subsurface soil that is commingled or in contact with the waste within the surface impoundment and surface soil located immediately downgradient from the impoundment area, including soil and sediment in swales, drainage ditches, and runoff areas, if any
- Air containing airborne particulates/dust or gaseous materials originating from the impoundment or its contaminated dikes or embankments
- Ground water in the vadose and saturated zones
- Surface water

Landfarm

This contaminant source typically includes an above ground area or open space on the ground surface where solid waste such as sludges or contaminated soil or sediment are placed, dumped, or discharged, and commingled with soil by mechanical means (e.g., bulldozer or tractor equipped for soil mixing). Abandoned landfarms or landfarms that have not been used for a long time may not be visually identifiable. Releases from this source may contaminate other sources, including:

- Surface and subsurface soils within the contaminant source area, and surface soil immediately downgradient from the source area
- Air containing airborne particulates/dust originating from the source area

Landfill

This contaminant source typically includes a below ground area filled with waste materials, debris, sludges, or contaminated soils. This source is typically abandoned or non-operational, uncontrolled, or out of compliance with EPA's minimum technology requirements for a land-based disposal unit, and may include the entire physical boundary of the landfill or a portion thereof (e.g., old cells). This source may be covered by soil or an artificial barrier, or may contain exposed contaminated structures, drums, or contaminated surface soil. Releases from this source may contaminate other sources, including:

- Subsurface soils that are commingled or in contact with the waste within the landfill
- Surface soil or exposed subsurface soil that is commingled or in contact with the waste within the landfill and surface soil located immediately downgradient from the source area, including soil and sediment in swales, drainage ditches, and runoff areas, if any
- Air containing airborne particulates/dust or gaseous materials vented from the landfill or originating through the landfill cover
- Ground water in the vadose and saturated zones

Map Tube Vault and Footing Drain

This contaminant source typically includes a below ground vault with drainage footing tile systems to divert subsurface water. The vault has multiple compartments (tubes) that can be used to store high level or transuranic wastes that may also contain hazardous substances. Due to maintenance or construction problems, it is not uncommon to find that the vault's structures have been degraded. Releases from this source may contaminate other sources, including:

- Surface and subsurface soils within the contaminant source area, including the subsurface soil at the footing drain
- Surface soil immediately downgradient from the source area, including soil and sediment in swales, drainage ditches, and runoff areas, if any
- Air containing airborne particulates/dust originating from the source area

Oil/Water Separator

This contaminant source consists of a below ground-surface concrete structure or tank-like device used to trap or separate oil from process water or fluids containing oil as a free-phase product. It may also contain sludges or residues. Many oil/water separators have been abandoned in place, cracked, or had their above ground structures partially demolished. Releases from this source may contaminate other sources, including:

- Surface and subsurface soils within the contaminant source area, including the subsurface soil surrounding the inlet and discharge pipes
- Surface soil immediately downgradient from the source area, including soil and sediment in swales, drainage ditches, and runoff areas, if any

- Air containing airborne particulates/dust and gaseous materials originating from the source area

Residual Soils and Sediments After Physical Removal

This contaminant source typically consists of residual surface soil, subsurface soil, or sediments remaining in an area where removal actions have been conducted. A removal action addresses physical structures, such as tanks, buildings, contaminated soils, sediments, or aggregates; however, the residual media may still be contaminated and could be a source for potential exposure pathways. Releases from contaminated soils and sediments may contaminate other sources, including:

- Ground water in the vadose and saturated zones
- Surface water

Storage Pad for Waste Drums or Containers

This contaminant typically includes a concrete, asphalt, or graveled pad, or a clear open area on the ground. Typically, debris, abandoned equipment, and waste containers of different sizes and shapes are stored on these pads. Releases from this source may contaminate other sources, including:

- Surface and subsurface soils (if the pad has poor integrity) within the contaminant source area
- Surface soil immediately downgradient from the source area, including soil and sediment in swales, drainage ditches, and runoff areas, if any
- Surface water

Waste Pile/Open Disposal Area

This contaminant source typically includes an above ground area or a depression on the ground surface where scrap metal, solid waste, drums (with or without their contents), and other contaminated aggregates or media are placed, discharged, or abandoned. The waste pile may or may not have an engineered barrier such as concrete or asphalt pads between the waste materials and the soil. Typically, the waste pile is not covered by a roof, although sometimes canvas or plastic tarp may be used to cover the waste materials either partially or entirely. Releases from this source may contaminate other sources, including:

- Surface and subsurface soils (if the pile has no engineering barrier or if the barrier has poor integrity) within the contaminant source area
- Surface water
- Surface soil immediately downgradient from the source area, including soil and sediment in swales, drainage ditches, and runoff areas

- Air containing airborne particulates/dust originating from the source area

Release Mechanisms

A release mechanism is the manner by which hazardous substances and their constituents (chemicals or radionuclides) are released or made to leave their sources or matrices of sources. A release mechanism can be physical, chemical, or thermal. The physical and chemical nature of the hazardous substances or radionuclides in the contaminated source and its immediate environment (e.g., acidity, alkalinity, and sorptive properties of the receiving media) may influence the release mechanism. Several release mechanisms can occur simultaneously at a contaminated source.

Chemical Transformation

Chemical transformation is due to a variety of chemical reactions, such as oxidation. During chemical transformation, a hazardous substance (chemical or radionuclide) changes chemical characteristics (e.g., the conversion of lead to lead chloride or lead sulfate in acidic soil) and physical characteristics (e.g., solubility, vapor pressure). Other examples include the hydrolysis of many chemicals with water, the methylation of mercury, radiological decay, and photolysis. This release mechanism modifies the effectiveness of other release mechanisms.

Digging and Burrowing

This release mechanism refers to human or animal activities that cause the hazardous substances and/or their constituents to be released from a contaminant source. Construction activities that entail soil or sediment excavation, and burrowing actions by small mammals are examples of this release mechanism.

Dredging and Tracking

This release mechanism is caused by the physical force posed by act of dredging or tracking (vehicular or foot traffic). Under this release mechanism, the hazardous substances and/or their constituents are released from the matrix surfaces (solid, semi-solid, or liquid) into air in the form of particulates or fugitive air emissions, or into water in the form of solubilized chemicals or suspended solids. Dredging or tracking actions also serve as migration pathways that transport the released hazardous substances and their constituents to other media or locations.

Force of Gravity

This release mechanism is most applicable to sources that have inadequate containment systems or poor integrity. Hazardous substances and their constituents may leak from a unit (e.g., tank, container, surface impoundment, waste pile) to adjacent soils. Under this release mechanism, the hazardous substances are pulled by gravity toward lower subsurface strata through the path of least resistance.

Hydraulic Gradient

This release mechanism refers to the pressure caused by differences in ground water depths that results in the hazardous substances and their constituents being released from the source or structures/barriers. A typical example is the leaching of hazardous waste or hazardous constituents

through the liner of a surface impoundment or landfill.

Leaching

This release mechanism refers to the movement of soluble chemicals via infiltration into surface soils. Leaching could be viewed as the combined mechanisms of gravitational force, hydraulic gradient, and solubility. As a result of atmospheric precipitation, and runoff from storm and/or ground water recharge, infiltration leaching action removes the hazardous substances and their constituents from a source (e.g., soils) to other media (e.g., perched aquifer).

Runoff

This release mechanism refers to the physical force, posed by surface water moving in a downstream direction, that removes the hazardous substances and their constituents from the source and transports them to other media. Runoff also serves as a migration pathway that transports released hazardous substances and their constituents to other media or locations. The effectiveness of this release mechanism is typically related to other mechanisms, such as solubility. Runoff action is a predominant cause of release of hazardous substances in contaminated soils along swales channels, river banks, or ground water recharge areas. Flooding overland flow may be considered a runoff mechanism on a larger scale.

Solubility

This release mechanism refers to the forming of chemical bonds within the solvent or water matrices. Polar compounds form ionic bonds with the water molecules, acids, or bases. Non-polar compounds form weak intermolecular bonds with van der Waals forces in common solvents like kerosene, jet fuels, hexane, or isopropyl alcohol. Release stops when the solubility or saturation limit is reached within the solubilizing agent.

Tidal Action

Like runoff, this release mechanism refers to the physical force posed by the movement of surface water caused by gravitational force from the moon (diurnal) or storms (episodic). Tidal action can act as a release and a transport mechanism, removing the hazardous substances and their constituents from one medium to another, as well as from one location to another. Tidal action is applicable to large inland lakes, and marine and coastal areas.

Uptake

This release mechanism refers to physical and/or chemical means occurring at the barrier between an organism and the contaminated media. Under this release mechanism, the hazardous substances and/or their constituents are released from the matrix (food, soil, sediment, and surface water) by physical means (e.g., molecular diffusion), biochemical means (e.g., active transport), or chemical means (stomach acids), or a combination of the above. The biochemical processes following ingestion and plant translocation mechanism at the root zone are examples of uptake release mechanism.

Volatilization

This release mechanism is dependent on the chemical characteristics of the hazardous substance (i.e., molecular weight, vapor pressure, Henry's Law constant, boiling point, etc.), ambient temperature, and wind velocity or air movement. Under this release mechanism, the hazardous substances and/or their constituents are released from the matrix surfaces (solid or liquid) into air (pores in soil or the ambient air). This release mechanism is most applicable to volatile organic chemicals and, to a lesser extent, semi-volatile organic chemicals.

Wind Erosion

This release mechanism refers to the frictional force, posed by air movement near the earth surface, that removes the hazardous substances and their constituents from the source to air. Under this release mechanism, the hazardous substances and/or their constituents are released from the matrix surface into air. This release mechanism is most applicable to metals and semi-volatile organic chemicals.

Exposure Mechanisms

This is a term used to describe the manner by which hazardous substances or radionuclides released from the source and transported to the exposure media (e.g., soil, sediment, ground water, indoor air, ambient air, surface water, and food/biota) are available to an organism (humans or ecological receptors) for absorption at the barrier surfaces. Point of exposure is the location where exposure media (e.g., soil, sediment surface water, ground water, or biota) are present.

Dermal Contact

This exposure mechanism refers to the exposure to released hazardous substances and their constituents via the dermal route.

Ingestion

This exposure mechanism refers to the exposure to released hazardous substances and their constituents via the ingestion route. Hazardous substances and their constituents present in ground water or surface water may be ingested if water is potable, and the exposure point is located downgradient from the contaminated source and is hydraulically connected. Contaminants may be present in biota if the contaminant is bioaccumulative (e.g., PCBs, dioxins/furans, PAHs, and certain metals [e.g., antimony, arsenic, barium, beryllium, cadmium, chromium, lead, nickel, mercury, selenium, silver, and thallium]) and is attractive to ecological species due to availability of food, and harborage/shelter.

Inhalation

This exposure mechanism refers to the exposure to released hazardous substances and their constituents via the inhalation route. The released substances and constituents present in air may be inhaled if the receptor is located downwind from the source.

Receptors

Receptors are human or ecological species that are potentially exposed to contaminants at the source area or other locations where contaminants were transported because of release mechanisms. A receptor may be exposed to hazardous substances via several exposure pathways. Receptor characterization includes determining locations of potential receptors, activity patterns, and the presence of subpopulations.

Many receptor types or species could be exposed to the hazardous substances or radionuclides released and transported from the source to the exposure media. According to Risk Assessment Guidance for Superfund (RAGS), only significant receptors are to be evaluated for exposure pathway completeness. These receptors should be those who have the highest degree of exposure (high-end exposure), based on consideration of the exposure patterns (frequency, duration, and contact rate). In the case of ecological receptors, any identified threatened or endangered species should also be considered.

Aquatic

These receptors include free-swimming and benthic organisms, and aquatic vegetation. These species could be exposed to contaminated surface water, sediment, ground water infiltration (intersecting surface water), and/or runoff carrying contaminated soil or sediment. Bottom feeders or prey fish may ingest contaminated benthic invertebrates or other aquatic species if the site contaminants are bioaccumulative and have been transported from the site to surface water bodies, resulting in biomagnification of hazardous substances.

Occupational

Occupational receptors include persons who work or live on site (e.g., construction workers, industrial workers, office workers, groundskeepers, visitors). Depending on their activities and where they are located relative to the source area, these humans may be exposed via airborne contaminants (gaseous [including indoor air] or fugitive dust emissions/particulates), incidental soil and sediment ingestion, and dermal contact. If they use on-site wells or surface water, they may be exposed to the contaminants if such media have been contaminated. If food chain species have been impacted, these persons may be impacted if such food or species are collected or hunted and ingested, although this is highly unlikely in most occupational settings.

Public

Public receptors include humans who live or work near the site (off-site residents and workers). Public receptors may be exposed to airborne contaminants (gaseous or fugitive dust emissions/particulates) if they are located downwind from the site, or to contaminants in surface water or ground water, if these waters are used and if contamination is feasible or has occurred, and if the flow directions are toward these receptors. Public receptors may also be exposed to contaminants via ingestion of contaminated food/species collected or hunted.

Terrestrial

These receptors include wild, domestic, farm, and game animals and plants. These animals and may

be subject to exposure from airborne contaminants (gaseous or fugitive dust emissions/ particulates) if the ambient air is contaminated. If these receptors use contaminated surface or ground water or are provided with such water for consumption, they may be exposed. If these species ingest food crops or other species that bioaccumulate site contaminants, these terrestrial species may also be impacted. On-site burrowing animals may be impacted or exposed via incidental soil ingestion, inhalation, and dermal contact routes of exposure.

Trespasser/Non-Residential Visitors

These receptors include humans who live off site and come in contact with the site at a frequency less than on-site workers or residents. They include visitors, contract personnel, and delivery personnel. The relevancy of these receptor categories will depend on the exposure area and the anticipated activities of the receptor groups. Depending on their activities and where they trespass or visit the site and the source area, these receptors could be exposed via airborne contaminants (gaseous emissions or fugitive dust emissions/particulates), incidental soil and sediment ingestion, or dermal contact. If they wade or swim, they may be exposed to the contaminants in on-site sediment or surface water. If food chain species have been impacted, these receptors may be impacted if such food/species are collected or hunted and ingested.



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Support

EH-413 developed the SCEM Builder to facilitate generation of the SCEM diagrams requested by EPA as part of CERCLA documentation. The SCEM Builder is distributed free of charge primarily to DOE personnel involved in CERCLA and RCRA actions. EH-413 can conduct demonstrations and/or training workshops if requested by DOE offices.

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